Limiting Bird Damage in Fruit Crops: State of the Art Pest Management Tactics Workshop

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Abstract:
A workshop was held to teach attendees about state-of-the-art bird management practices to protect fruit crops. Presentations on the bird species most responsible for damage in fruit plantings, the economic consequences, consumer perceptions of management tactics used (e.g. fatal shooting vs. use of kestrel boxes), results of a NY grower survey on bird management practices being used and their efficacy, tactics for deer management in fruit, regulations and permitting for wildlife management, factors in a planting that can place fruit at risk, pest mitigation strategies, and research results on using air dancers to prevent bird predation of fruit were followed by field demonstrations on bird netting, bird scare devices and falconery. Growers, educators and wildlife managers came away with comprehensive knowledge about successful bird management strategies in susceptible fruit crops, including sweet and tart cherry, blueberry, 'Honeycrisp' apples and wine grapes that have been researched in the USDA SCRI project, Limiting Bird Damage in Fruit Crops.

Workshop Description:
A workshop on bird damage management topics was presented for growers, educators and wildlife managers in Eastern, NY and was broadcast via webinar to four locations in New York State. Juliet Carroll and Paul Curtis developed the webinar agenda and topic offerings, with local support from Laura McDermott and James O'Connell, Cornell Cooperative Extension educators with the Eastern NY Commercial Horticulture Program. Attendees gained comprehensive knowledge about successful bird management strategies in susceptible fruit crops, including sweet and tart cherry, blueberry, 'Honeycrisp' apples and wine grapes.

The vertebrate damage management workshop, *Limiting Bird Damage in Fruit: State-of-the-Art Pest Management Tactics*, was held on August 19, 2015 at Cornell Cooperative Extension of Saratoga County, 50 W. High St., Ballston Spa, NY 12020. In the morning session attendees learned about the bird species that damage fruit in NY, economic losses from birds to fruit, consumer preference for management tactics (e.g. kestrel nesting boxes), the results of a NY grower survey, tactics for deer management, regulations & permitting for wildlife control, landscape factors that place fruit at risk, and bird mitigation strategies. In the afternoon,

attendees traveled to a farm to experience field demonstrations of falconry, air dancers, bird netting and exchanged insights through discussions of tactics being used.

The morning classroom session was presented as a WebEx webinar in Riverhead, Newark, Albion, and Portland, NY, and hosted by Cornell Cooperative Extension educators, Dale Moyer, Matt Wells, Deborah Breth, and Timothy Weigle, respectively. Those attending the morning session at any of the locations were eligible to receive 2.5 re-certification credits for their New York State Department of Environmental Conservation pesticide applicator license. Seven presentations were given during the morning session.

Titles, presenters and talk descriptions

Bird species most responsible for damaging fruit crops, presented by Paul Curtis, Dept. of Natural Resources, Cornell University. (20 minutes)
Usually only a handful of bird species cause damage to fruit crops, and most have federal and state protection. European starlings are the exception, and being an invasive, exotic species, they can be killed at any time in any legal manner. American crows may damage fruit, but they are a game bird in New York and federally protected. However, regulations exist for farmers to kill crows, or other blackbirds, without a permit if they are damaging crops. A variety of songbirds (e.g., American robins, cedar waxwings, house finches, blue jays, etc.) often take fruit, but all are protected by the federal Migratory Bird Treaty Act and state environmental conservation laws. Growers must rely on netting, scare devices, or repellents to reduce damage caused by these protected species.

Birds in fruit crops: economic and consumer aspects of deterrence, presented by Catherine Lindell, Dept. of Integrative Biology, Michigan State University. (15 minutes)
Some bird species consume large quantities of cultivated fruit while others perform ecosystem services by eating species that damage fruit crops. We quantified 1) costs to fruit growers of damage caused by frugivorous birds, 2) diets of American kestrels, predatory birds with declining populations in much of the U.S. that we attracted to orchards by installing nest boxes and 3) potential price premiums consumers will pay for fruit produced with predator nest boxes. Results indicate high costs of bird damage to fruit. Kestrels eat a number of crop pest species and consumers are willing to pay modest price premiums for fruit produced using nest boxes as a pest management strategy.

Grower perceptions of bird damage to fruit crops in New York, presented by William Seimer, Dept. of Natural Resources, Cornell University. (15 minutes)
Although the costs of bird damage and damage prevention have been a long-standing concern to fruit producers, these topics have received little recent attention from researchers. In 2011, an interdisciplinary team of researchers, led by Dr. Catherine Lindell at Michigan State University, were awarded a NIFA multi-state grant to study bird damage to fruit crops in New York and other major fruit-producing states (i.e., Michigan, Washington, Oregon, California). We surveyed producers of wine grapes, tart and sweet cherries, blueberries, and Honeycrisp apples to estimate perceptions of bird damage and effectiveness of damage prevention methods. Producer estimates of yield lost to bird damage in 2011 ranged from 6% in wine grape to nearly 30% in sweet cherry crops. These estimates were very similar to estimates of yield loss to bird damage based on field research completed by the project team in 2012. Sixty-five percent of New York

fruit producers reported that they typically take some actions to prevent or reduce bird damage to their crops. From 86% (Honeycrisp producers) to 100% (sweet cherry producers) of producers took actions to protect their most important crop. Producers who took some action to prevent or reduce bird damage believed that their crop losses to bird damage would be much higher if they took no actions.

Tactics for managing deer in fruit, presented by Paul Curtis, Dept. of Natural Resources, Cornell University. (30 minutes)
Growers must deal with deer damage to trees or vines year-round, and fruit near harvest time. Deer repellents usually have limited use because of their cost and the multiple applications needed. Also, very few deer repellents are registered for food crops. Fencing provides the most reliable protection for fruit crops, but the cost may be prohibitive for some growers. NYSDEC Deer Damage Permits, or Deer Management Assistance Program tags, may help growers reduce the number of deer near an orchard. However, these tags are most useful for short-term control, and may not resolve a deer problem. Also, growers would need to find designated shooters, and the orchard must have safe shooting zones. Usually an integrated approach to deer management is needed for growers to be successful.

Wildlife management: bird resources, regulations and permitting, presented by Kenneth Preusser, USDA Wildlife Services, Castleton, NY. (20 minutes)
The mission of USDA-APHIS-Wildlife Services is to provide federal leadership and expertise to resolve wildlife conflicts to allow people and wildlife to coexist. When damage from wildlife occurs, Wildlife Services personnel may be able to mitigate crop losses through program delivery, technical service, and other activities through the USDA New York State Office near Albany. National and state regulations for managing birds in fruit crops cover such things as population reduction through shooting of game species by a licensed hunter in the appropriate season (crows, turkeys); or unprotected species (European starlings, English sparrows, pigeons). State and federal regulations allow for the take of certain blackbird species at specific times if they are damaging crops. All state and local firearms laws, regulations, and ordinances must be followed, as defined by the New York State Department of Environmental Conservation, and appropriate permits obtained. Wildlife Services personnel can assist farm owners with obtaining federal permits for bird management in cases where they may be needed. Wildlife Services staff may also contract for bird control (including avicides) on dairy farms, or assist with mitigating deer damage in some situations.

Risk factors for bird damage in fruit and mitigation strategies, presented by Catherine Lindell, Dept. of Integrative Biology, Michigan State University. (40 minutes)
Our work in New York, Michigan, and the Pacific Northwest from 2012-2014 suggest two Bird Management Principles. Principle One: when there is less fruit in a given area, there will be a higher percent loss compared to areas with more fruit. Thus, expect a higher proportion of damage in: 1) low-yield years, 2) early-ripening varieties (birds will have few alternatives), and 3) blocks that abut non-fruit land-cover types. Principle Two: blocks near resources important to birds are at higher risk for damage. When/where to expect higher bird damage: 1) blocks under wires, 2) edges of blocks, 3) near night roosting sites, and 4) isolated blocks with little human activity. Whether and how much to invest in bird management in a given year will depend on the costs of bird management versus anticipated fruit losses. Although percent damage for sweet

cherries and 'Honeycrisp' apples in New York and Michigan was much lower in 2014 compared to 2012, a small percent loss of a large crop could be worth enough to warrant management strategies. However, our results also suggest that bird deterrent techniques like various types of scare devices may have little impact when yields are large.

Scare devices investigated in fruit plantings in New York, presented by Paul Curtis, Dept. of Natural Resources, Cornell University. (30 minutes)
Birds are highly mobile and may damage a variety of fruit crops. The majority of bird species causing damage are federally and state-protected, so lethal control is rarely an option. Registered repellents containing methyl anthranilate have had mixed success in fruit crops. Most fruit growers rely heavily on scare tactics to reduce avian damage to crops. We tested devices commonly used by fruit growers to deter birds (e.g., distress callers, hawk kites), and also evaluated a novel method (air dancers). Air dancers showed some utility in reducing bird damage to grapes, and were readily accepted by most growers.

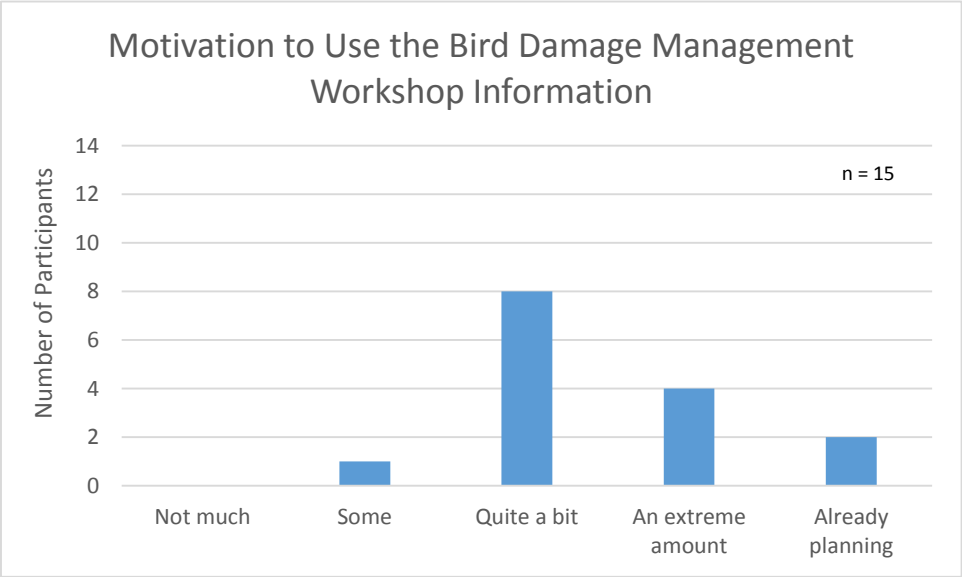
The afternoon on-farm demonstrations
Held at Bowman Orchards, 141 Sugar Hill Rd., Rexford, NY where Kevin Bowman was our host, we toured his farm to see an entire blueberry planting under bird netting and sweet cherry trees netted against birds. Growers had several questions about the bird netting over the blueberries. The netting over the blueberries was held up with a framework such that it was possible for pickers to walk under the netting. By contrast, netting was draped over the sweet cherry trees, making picking difficult. Netting remains among the best tactics for bird damage management in fruit crops. Affording the investment and managing its placement on the fruit crop are two major disincentives.

Stuart Rossell, American Falconry Services, LLC, demonstrated falconry in an open field with orchard on one edge, woods and hedgerows on the other edges. His hybrid falcon, Twilight, flew a typical flight during which all pigeons, crows, starlings and swallows in the vicinity disappeared. He described how falconry is used for bird management. Currently, most demand for falconry services is for the control of large birds, such as gulls and crows, over airports and landfills. The attendees learned that a falcon the size of Twilight would be appropriate for apples, where the target bird species is primarily crows. For bird management in fruit crops such as sweet cherry, tart cherry, blueberry, and grapes that are damaged by cedar waxwings, robins, and blackbirds, smaller falcons would be flown. It requires about two weeks to train a falcon, but many years to train as a falconer. Falconry services for bird management span a four hour period where the falcon is flown several times over different areas of the treatment zone, i.e. fruit planting. The services are specifically targeted to deter the target bird species and achieve better results than simply having someone who owns a falcon fly the falcon over a fruit planting. For example, the falconer will flush out the birds hiding in the fruit planting to make them accessible to the falcon.

Air dancers were demonstrated near the pavilion so that electric power was available to run the air blower to inflate the large parachute material puppet. Grower discussion centered on how far the air dancer could be from the electric power, how long a gas-powered generator would run, and how large an area was protected by the air dancer. The impact of rain wetting the parachute material and making it more difficult to inflate was mentioned. Air dancer placement near

orchard trees may cause them to become tangled in the branches, making it difficult to re-inflate the following day. As with any scare tactic, it would be essential to move the air dancer to prevent acclimatization by the target bird species.

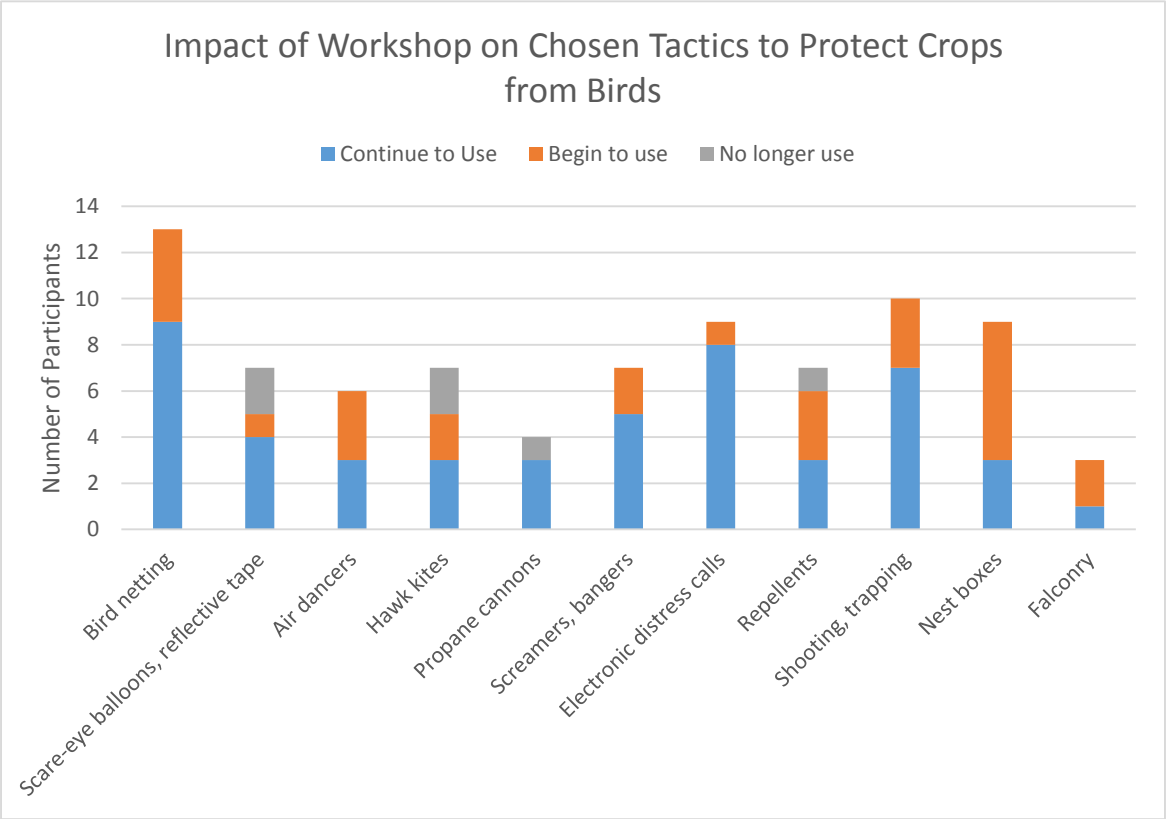
Outcomes and impacts:
A total of 29 people attended the workshop, plus 13 presenters and organizers for a total of 42. Eight people attended the webinars and 21 attended the workshop. Workshop evaluations were distributed to all and 17 were returned. Attendees included farmers (9), farm managers (3), wildlife biologists (2), wildlife managers (1), and extension personnel (2). Crops grown by those responding included, grapes (7), tree fruit (7) (including apple, cherry, peach and apricot), berry crops (6), and vegetables (2).



Eight respondents reported they gained knowledge during the workshop, four from minimal understanding of bird damage management before the workshop to moderate understanding after, and four from having a moderate understanding to having considerable understanding. Those whose knowledge level remained the same, all reported having considerable knowledge of bird damage management before and after the workshop. The impact of the workshop was also assessed by asking the attendees how motivated they are to use the information gained in the workshop. Of those responding to this question, most (53%) answered “quite a bit”, 27% answered “an extreme amount”, and 13% answered “already planning.”

We also evaluated whether the attendees would change their bird damage management practices as a result of the information presented during the workshop by asking which of 11 tactics they will continue to use, begin to use, or no longer use. Tactics that respondents will begin to use included (in order of frequency) nest boxes, bird netting, air dancers, shooting/trapping, repellents, hawk kites, screamers/bangers, falconry, scare-eye balloons/reflective tape, or electronic distress calls. Of these “begin to use” tactics, some respondents indicated they would no longer use scare-eye balloons/reflective tape, hawk kites, or repellents. Interestingly, one person indicated they would no longer use propane cannons and no one selected to begin to use that tactic. The two tactics with the largest growth, 2-fold, were nesting boxes which included

three current users and six new users, and falconry with one current user and two new users. Air dancers and repellents showed a doubling of users, three current and three new.



Evaluations showed that new information was learned in every one of the presentations, indicating that there is still a need to extend this information to growers and wildlife managers. A few attendees commented that it would be optimal to present the information again once all the data generated in the SCRI project has been analyzed and final conclusions drawn. A suggestion on data analysis was to investigate if the percentage of fruit damaged or eaten in a low cropping year, while higher than in a high cropping year, might represent the same overall number of fruit damaged or eaten. The assumption being that the same number of birds are eating the same number of fruit, but the percentage is higher due to lower crop abundance.

Resources provided & developed:

Reprints and bulletins

Eaton, A. 2010. Bird Damage Prevention for Northern New England Fruit Growers. Univ. New Hampshire Cooperative Extension. 20 pp. http://extension.unh.edu/resources/files/Resource001797_Rep2514.pdf, accessed Sept. 11. 2015.

Siemer, W., Curtis, P., Henrichs, H., Carroll, J., Lindell, C., and Schwiff, S. 2014. Grower Perceptions of Bird Damage to New York Fruit Crops in 2011. New York Fruit Quarterly 22(2):25-28.

Economic analysis fact sheets, Limiting bird damage to fruit crops, USDA SCRI

The Economic Impact of Bird Damage to Wine Grapes, birddamagetofruitcrops.info/PDFs/Factsheets/Final%20Wine%20Grapes%20Factsheet.pdf
The Economic Impact of Bird Damage to Tart Cherries, birddamagetofruitcrops.info/PDFs/Factsheets/Final%20Tart%20Cherries%20Factsheet.pdf
The Economic Impact of Bird Damage to Sweet Cherries, birddamagetofruitcrops.info/PDFs/Factsheets/Final%20Sweet%20Cherries%20Factsheet.pdf
The Economic Impact of Bird Damage to Blueberries, birddamagetofruitcrops.info/PDFs/Factsheets/Final%20Blueberries%20Factsheet.pdf
The Economic Impact of Bird Damage to 'Honeycrisp' Apples, birddamagetofruitcrops.info/PDFs/Factsheets/Final%20Honeycrisp%20Factsheet.pdf
The Economic Impact of Bird Damage to Select Fruit Crops in New York, birddamagetofruitcrops.info/PDFs/Factsheets/Final%20NY%20Factsheet.pdf

Limiting bird damage to fruit crops, USDA SCRI project newsletters
Limiting bird damage in fruit crops, NY, October 2014
Limiting bird damage in fruit crops, NY, January 2014
Limiting bird damage in fruit crops, NY, January 2013

Wildlife damage fact sheets
Curtis, P. 2015. Wildlife management in blueberry. Cornell Fruit Resources, http://www.fruit.cornell.edu/berry/ipm/ipmpdfs/WildlifeManagement-Blueberry.pdf, accessed Sept. 11, 2015.
Curtis, P. 2015. Wildlife management in grape. Cornell Fruit Resources, http://www.fruit.cornell.edu/grape/pdfs/WildlifeManagement-Grapes.pdf, accessed Sept. 11, 2015.
Curtis, P. 2015. Wildlife management in apple. Cornell Fruit Resources, http://www.fruit.cornell.edu/tree_fruit/resources/WildlifeManagement-Apples.pdf accessed Sept. 11, 2015.
Eaton, A., Mattoon, N., Carroll, J., and Curtis, P. 2015. List of suppliers for bird control devices – 2015. Cornell Fruit Resources, http://www.fruit.cornell.edu/pdfs/Suppliers%20for%20Bird%20Control%20Devices%202015_workshop.pdf, accessed Sept. 11, 2015.

Miscellaneous
Risk factors for bird damage in fruit and mitigation strategies, Catherine Lindell, Michigan State University, handout
Wildlife management: bird resources, regulations and permitting, Kenneth Preusser, USDA APHIS Wildlife Services, powerpoint slides handout
The year in review, 2013-2014, New York State Integrated Pest Management, Cornell Cooperative Extension, NYS IPM Program.
Cornell Fruit Resources, www.fruit.cornell.edu, bookmark, Cornell University College of Agriculture & Life Sciences

Videos
Webinar videos from the *Limiting Bird Damage in Fruit: State-of-the-Art Pest Management Tactics* workshop presentations were posted on the NYS IPM You Tube Channel and linked on Cornell Fruit Resources as a playlist, https://www.youtube.com/watch?v=yHzaKDRZiFk&list=PLoNb8lODb49vWWRgYS9ObLT2zi3vb3JBS.